may be so gross that even lactose can project a substantial image. Animals, on the other hand, can be subjected to a long and precise training so that the salient features of the situation when the drug is given can be known. In terms of the mirror analogy, the effects of the drug are seen in a mirror whose contours can be mapped and sources of distortion identified. Knowledge of the effects of the drug in such favorable circumstances will make it possible to devise experiments in human subjects that will minimize, or permit identification of, the distortions due to individual characteristics.

It is not that one does not need to study man; it is that studies in man require background information that can be permissibly obtained only in animals. To study only man is to ensure that psychopharmacology will progress mainly in the number of new drugs of whose effects we are largely ignorant, while for the older drugs we remain unable to improve on the descriptions of Shakespeare, De Quincey, and Huxley.

PETER DEWS
Department of Psychiatry, Harvard Medical School, Boston, Massachusetts

Compendium

Handbook of Physics. E. U. CONDON and HUGH ODISHAW, Eds. Second edition. McGraw-Hill, New York, 1967. xxxii + 1626 pp., illus. $32.50.

Let us be clear what this book is: 93 chapters designed to cover almost every topic of physics. If you like, here is the poor (but not insolvent) man's one-volume condensation of the immense *Encyclopedia of Physics*. It bears testimony to the great effort put forth by the editors—especially Condon—in attempting to collect at once all that is meaningful in physics. About such compendia, we may ask: (i) Are such things useful, and in what way are they useful? (ii) Is this one useful?

Questioning usefulness categorically is a delicate matter. What do I read such handbooks for? Usually, it is not for anything in my own area of expertise—plasma physics—because I have more material in my mind or at hand, organized to suit. Usually, it is not in areas where I wish to gain additional real working knowledge—vacuum technique, or electronic circuits, for instance—because I discover that I would learn that way some dangerously obsolete arts. Rather, I should consult my colleagues, or do some work in the library. Usually, it is not in completely strange areas, because there is more news in a handbook than I can stand. Yet a handbook is useful: sometimes for numbers, if I have some feel for what is there; sometimes for basic ideas, even if I know that I must go elsewhere to be up to date; but mostly to give me some feel for what the topic is all about, in an interesting way, without committing me either to being an expert or to an institution. For example, in this handbook there is a delightful new chapter on glass. Surely it contains much less archival information than the old one in the first edition, and would be held in derision by some; but for me it is just right. All too often these real requirements of such a book—which differ from those of a text, or a review article—are not understood by contributing authors.

How does Condon and Odishaw fare, now revised, now ten years after publication of the first edition? I count 25 chapters totally unchanged, 29 slightly changed, 15 substantially so, and 24 fully modified or rewritten. Too many are unrevised. It must always be so in a book such as this, for original authors cannot or will not take on the unlively task of rewriting their old work; and others cannot be found to do the rewriting. Thus, in spite of Job's wish (19:23,24), the wisdom of an age dies in its original form, and to be most useful must rise quite anew.

All this is to say that the magnificent collection is starting to show its age, and hence to lose its value, in spite of the revisions. Some of the presumably more stable areas are well revised—for example, mathematical topics and nuclear physics. But many really fast-changing areas are out of date: mechanical control mechanisms; fluid mechanics, including waves therein; and so forth. Where are to be found modern electronics or transistor circuits, signal-to-noise concepts that are so important in many physics experiments, enough on fuel cells, new vacuum techniques, high-intensity optical sources, lasers, image reconstruction, recent applications for x-ray techniques? Nevertheless, these represent a minority of the topics, and the book is valuable for several years yet as a reference.

D. J. ROSE
Oak Ridge National Laboratory, Oak Ridge, Tennessee

Luminescence of Biopolymers

Fluorescence and Phosphorescence of Proteins and Nucleic Acids. SERGEI V. KONEV. Translated from the Russian edition (Minsk, 1965). Sidney Udenfriend, Translation Ed. Plenum, New York, 1967. x + 204 pp., illus. $9.50.

During the last ten years the continuing progress in optics and electronics has made it possible to study the fluorescence and phosphorescence of proteins and nucleic acids with increasing accuracy and with better spectral resolution. With the improved knowledge of the structure of macromolecules these spectroscopic methods have come into their own, for they provide some of the most sensitive and refined techniques that we possess for the observation of these molecules in solution. A book containing an exposition of the spectroscopic foundations and a critical survey of the vast and often unreliable experimental material is greatly to be desired.

Konev's book is a summary of the contributions of the Russian school to this topic, together with less emphatic consideration of the work done outside the Soviet Union. The first 50 pages, dealing with the excited states of tryptophan and tyrosine, provide a very good introduction to the subject. Unfortunately the succeeding chapters on fluorescence of proteins, energy migration, luminescence of nucleic acids, and luminescence of living tissues are of much smaller value. The author attempts to settle too many controversial matters on which a decision is not possible because of present-day technical shortcomings, to the detriment of honest exposition of the experimental material and its physical fundamentals. Very little is made of the heterogeneous origin of the fluorescence of proteins, which necessitates detailed consideration of each particular case on its own merits. Konev prefers to rely on easy and often erroneous generalizations. Thus by a demonstration of the constancy of the fluorescence spectrum of chymotrypsinogen with exciting wavelengths (p. 70 and fig. 28) he purports to show that in proteins containing tryptophan and tyrosine the fluorescence of the latter is not detectable. This general conclusion is contradicted—as it should be—when by the very same method the fluorescence of tyrosine is demonstrated in human serum albumin (p. 98 and fig. 34).

In general each succeeding chapter